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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/549,851	09/23/2005	Kazuhide Hasebe	33082M274	3704

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EXAMINER	
PATEL, REEMA	

ART UNIT	PAPER NUMBER
2812	

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02/11/2008	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/549,851	HASEBE ET AL.	
	Examiner	Art Unit	
	Reema Patel	2812	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *31 October 2007*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *3-16 and 19-22* is/are pending in the application.

4a) Of the above claim(s) *3,13 and 14* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *4-12,15,16 and 19-22* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *23 September 2005* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

This action is in response to an amendment filed 10/31/07.

Claim Objections

1. Claims 16 and 19-20 are objected to because of the following informalities: These claims include dependencies to withdrawn or cancelled claims. Appropriate correction is required.

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

3. Claims 12 and 16 are rejected under 35 U.S.C. 102(b) as being anticipated by Miyoshi (U.S. 6,325,857 B1).

4. Regarding claim 12, Miyoshi discloses a film-forming unit comprising:

- A nitrogen-including-gas supplying unit (157, Fig. 1) that supplies directly into the reaction chamber (col 2, lines 6-9);
- An activating unit (152, Fig. 1) that activates the nitrogen-including gas, the activating unit being a heating unit (col 1, lines 50-53; col 2, lines 28-35);
- A nitriding unit (153, Fig. 1) that nitrides a surface of a member in the reaction chamber by controlling the activating unit so as to activate the nitrogen including gas (col 1, lines 54-57).

5. Regarding claim 16, Miyoshi discloses the nitrogen-including gas is ammonia (col 2, lines 27-30).

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

7. Claims 4-9, 11 and 21-22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bolscher et al. (U.S. 6,468,903 B2) in view of Goto et al. (U.S. 2003/0010354 A1; hereinafter 'Goto').

8. Regarding claims 4 and 21, Bolscher discloses a method comprising:

- A deposit-removing step of removing a deposit stuck to an inside of a film-forming unit (col 2, line 58-62);
- A purging step of purging an inside of the reaction chamber by supplying into the reaction chamber a nitrogen-including gas that includes nitrogen and that is capable of being activated (col 2, line 63 - col 3, line 4),
- Wherein the purging step has a step of nitriding a surface of a member in the reaction chamber by activating the nitrogen-including gas (col 2, line 63 - col 3, line 4).

9. Yet, Bolscher discloses that the deposit-removing step occurs by supplying aqueous HF (col 2, lines 58-62) and not a fluorine-containing gas. However, Goto discloses removing various residues from the walls of a film-forming unit by supplying

molecular fluorine gas (F_2) ([0009], [0012]). Such a process has the advantage of removing residue without using a solvent and hence producing less waste. Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Bolscher with using F_2 gas, as taught by Goto, so as to remove deposits from the film-forming unit while producing less waste.

10. Regarding claims 5 and 7-9, Bolshcer discloses the nitrogen-including gas is ammonia (col 2, lines 33-34), the gas supplied to the reaction chamber is heated to a predetermined temperature (col 3, lines 4-12), the inside of the reaction chamber is heated to a range of 600-1050° C (col 3, lines 4-12), and the member in the reaction chamber consists of quartz (col 2, lines 29-31).

11. Regarding claim 11, Bolscher discloses a film-forming step of heating the inside of the reaction chamber containing the object to be processed to a predetermined temperature (col 2, line 67 - col 3, line 12), and forming a thin film on the object to be processed by supplying a process gas into the reaction chamber (col 3, lines 37-39).

12. Regarding claim 22, Bolscher discloses the thin film is a silicon nitride film (col 3, lines 36-39).

13. Regarding claim 6 Bolscher discloses the pressure is maintained at approximately 66 Pa (col 3, lines 6-12) but discloses that the exact value of the process conditions do not appear to be critical. The examiner notes that the applicant does not teach that the particular pressure range, as recited in claim 6, of 133 Pa - 53.3 kPa solves any stated problem or is for any particular purpose other than a stated experimental condition of the process. Therefore, the pressure range given in claim 6

lacks criticality in the claimed invention and does not produce unexpected or novel results. Thus, it would have been obvious to one having ordinary skill in the art at the time the invention was made to maintain the pressure in a range of 133- 53.3 kPa since the invention would perform equally well at a pressure of 66 Pa.

14. Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over Bolscher et al. (U.S. 6,468,903 B2) and Goto et al. (U.S. 2003/0010354 A1; hereinafter 'Goto'). as applied to claim 4 above, and further in view of Examiner's Official Notice.

15. Regarding claim 10, Bolscher and Goto disclose the nitrogen-including gas is an ammonia gas (Bolscher: col 2, lines 33-34) and also discloses that the film-forming apparatus can form a silicon nitride film (Bolscher col 3, lines 37-39). Yet, they are silent with regards to the process gas that can be used to form such a film. However, the examiner takes Official Notice that the use of ammonia and a Si-containing gas as process gases in forming a silicon nitride film is well known in the art (see for example, Agusta et al. (U.S. 3,865,652), col 3, lines 45-53). Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the invention of Bolscher and Goto with forming the silicon nitride film using a process gas comprising ammonia and a silicon-including gas so as to use readily available silicon nitride-forming precursors.

16. Claims 12, 15-16, and 19-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ishibashi (U.S. 6,942,892 B1; hereinafter '892') in view of Ishibashi (U.S. 6,375,756 B1; hereinafter '756').

17. Regarding claims 12 and 15-16, 892 discloses a film forming unit comprising:

a) A cleaning-gas supplying unit that supplies directly into the reaction chamber a cleaning gas that includes fluorine (col 5, lines 18-25; col 7, lines 16-19; col 8, lines 28-35);

b) A material gas supplying unit that supplies directly into the reaction chamber a material gas that is capable of being activated (col 5, lines 18-25; col 6, lines 18-22);

c) An activating unit (3, Fig. 1) that activates the material gas, the activating unit being a heating unit (col 6, lines 18-22);

d) A nitriding unit (30, Fig. 1) that nitrides a surface of a member in the reaction chamber by controlling the activating unit so as to activate the material gas (col 5, lines 37-45).

18. Regarding (a)-(b), Fig. 1 of 892 illustrates combining the cleaning gas and material gas before entering the chamber. However, 892 further discloses that the cleaning gas may be introduced through a different route than that of the material gas, for example through a nozzle (col 7, lines 16-19). Hence, in such a case, the cleaning gas supply and material gas supplying units can be thought to each individually supply their respective gases directly into the film forming unit.

19. 892 discloses that the film forming unit may form a silicon nitride film but does not disclose specific details regarding the type of material gas used to form such a film (col 8, lines 20-27). However, 756 discloses that using that it is known to use ammonia as a material gas for forming a silicon nitride film (col 5, lines 34-39). Therefore, it would

have been obvious to one having ordinary skill in the art at the time the invention was made to modify 892 with using a material gas of ammonia so as to form a silicon nitride film with a readily known precursor.

20. Regarding claim 19, 892 discloses the heating unit heats the inside of the reaction chamber but does not disclose the temperature of the ambient air within the chamber. However, it would have been obvious to one having ordinary skill in the art at the time the invention was made to maintain the temperature within the film forming unit to be in a range of 600-1050°C, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. *In re Aller,* 105 USPQ 233.

21. Regarding claim 20, 892 discloses a pressure adjusting unit but does not disclose a specific pressure maintained in the film forming unit (col 5, lines 33-36). However, it would have been obvious to one having ordinary skill in the art at the time the invention was made to maintain the pressure within the film forming unit to be in a range of 133 Pa to 53.3 kPa, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. *In re Aller,* 105 USPQ 233.

Response to Arguments

22. Applicant's arguments with respect to claims 4-12, 15-16, 19-22 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

23. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Reema Patel whose telephone number is (571)270-1436. The examiner can normally be reached on M-F, 8:00-4:30 EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael Lebentritt can be reached on 571-272-1873. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

RSP
2/1/08

/Michael S. Lebentritt/
Supervisory Patent Examiner, Art Unit 2812